POLITECHNIKA WARSZAWSKA

Agreement on

Dual Degree Master Program in Computer Engineering

between

Politechnika Warszawska

Faculty of Electronics and Information Technology

and

Technische Universität Berlin

School of Electrical Engineering and Computer Science

1 Subject of the agreement and aims

This agreement describes the academic and administrative conditions concerning the realization of a dual degree program supporting the exchange of students between Politechnika Warszawska (Warsaw University of Technology, WUT), Faculty of Electronics and Information Technology, and Technische Universität Berlin (TUB), School of Electrical Engineering and Computer Science. The aim is to enable TUB students of Computer Engineering and WUT students of Electrical and Computer Engineering (ECE) to receive degrees of both universities. This is based on the principle that the participating students have to fulfill the requirements of both study programs.

2 Academic conditions

2.1 Scope of agreement

This agreement applies to TUB students in the Master Program in Computer Engineering (CE) and WUT students in the Master Program in Electrical and Computer Engineering (ECE), who are well-versed in the English language, as demonstrated by a TOEFL test (a minimum of 83 internet-based test points or 560 paper-based test points) or B-2 level university exam (at least grade B).

2.2 Admission procedure

Both parties guarantee that participants of the dual degree program will be selected according to their academic, personal, and linguistic qualifications. To enter the dual degree Master Program, students first have to be admitted to the Master Program in CE or ECE, respectively, at their home institution. Not later than in their first year, students can apply for the dual degree Master Program. Applications are evaluated first by the home institution and then presented to the partner institution (which will become the student's host institution) for review and approval. To be admitted to the program, students must meet all graduate admission policies at both institutions, and must have advisors who agree to advise them at both institutions.

2.3 Exchange contingent

Up to five students are to be accepted by the host institution per year.

2.4 Acknowledgment of student's achievements on entering the dual degree program

On the assumption of fundamental equivalence and based on mutual trust in the academic quality of the host university's curriculum, it is agreed that

- WUT acknowledges the qualification for entrance to TUB CE Master Program.
- TUB acknowledges the qualification for entrance to WUT ECE Master Program.

2.5 Student supervision

Students will have an advisor at WUT and an advisor at TUB. After being accepted to the dual degree program, the student has to select an advisor at the home university in the desired field of specialization. In discussion with this advisor, a co-advisor in the same research area at the host university has to be found, who is willing to supervise the student's master thesis.

2.6 Curricular conditions

Period of study. The standard period of study is four semesters, consisting of three semesters of course work, and a master thesis. The first two semesters are studied at the home institution, the two last semesters are taken at the host institution.[1]

Required credits. Students are required to gather 120 ECTS in total. Usually, 60 ECTS are taken from WUT and 60 ECTS from TUB. At least 54 ECTS must be taken from either institution, i.e. up to 6 ECTS can be compensated by courses from the other institution.

[1] According to the respective local study regulations, ECTS credits from the preceding bachelor program may be acknowledged (Fundamentals / Basic Modules) reducing the study period at the home institution by one semester.

Course overlap. The courses attended at both institutions may overlap only slightly.

Master thesis. The master thesis accounts for 30 ECTS. The master thesis is expected to be written by the participants of Dual Degree Master Program in Computer Engineering in the 4th semester of the program at TUB or in the 3rd and 4th at WUT. It must be written in English, or, after the acceptance of WUT and TUB, in Polish or German, on a topic in the student's specialization area. It must be accepted by both advisors.

The master thesis is graded by respective examination diploma boards of WUT and TUB based on the grades of the WUT and TUB advisors and according to the respective regulations. The WUT and TUB examination diploma boards do not need to be separate.

Host country language. Students are expected to acquire basic skills in the language of the host country.

Seminar and project course. Students must take at least one seminar and one project course at TUB (for instance, a combined seminar/project module).

Specialization area. WUT students must choose two major subjects (Hauptfach, 12-18 ECTS) and one in-depth elective (Vertiefungsfach, 24 - 30 ECTS) among the specialization areas of Computer Engineering at TUB (see Appendix B for an overview and D for examples) and TUB students must choose either Computer Systems and Networks (CSN) or Telecommunications (TCM) at WUT as specialization area (see Appendix C for an overview and examples of courses).

Requirements. After admission to the program, students have to submit an individual study program that needs to be approved by the Dean of WUT and the Chairman of the Examination Board of TUB. The program should specify which courses will be taken by the student, at which semester and at which university. In justified cases, the study program can be modified. The changes require the approval of the Deans / Chairmans of the Examination Board of both universities. Depending on the local regulations the Dean may delegate this competence to the program coordinator or the Chairman

of the Examination Board. The program must fulfill all requirements of both TUB Computer Engineering curriculum and WUT Electrical and Computer Engineering curriculum.

2.7 Examination regulations

During the studies of WUT students at TUB, the examination regulations (Prüfungsordnung) of TUB apply in the current version. During the studies of TUB students at WUT, the examination regulations of WUT apply in the current version. Both partner institutions will hand out a transcript of records in English to students. The Transcript of Records is an official inventory of the courses taken, the achieved number of ECTS credit points, and national grades earned by the students throughout their stay in the host institution. Details of the grading schemes can be found in Appendix A.

2.8 Awarding the degrees

After successful completion of the complete program at both universities, the participating students receive the Master degree of both universities. TUB students will receive a Master of Science degree in the field of "Computer Engineering" from TUB and a Master of Science in Engineering degree in the field of "Macro-field of Study: Electrical and Computer Engineering" from WUT. WUT students will receive a Master of Science degree in the field of "Computer Engineering" from TUB and a Master of Science in Engineering degree from WUT in the field of "Macro-field Study: Electrical and Computer Engineering".

2.9 Program coordinator

Both institutions appoint a program coordinator responsible for the implementation of the program. In case of any difficulties the two program coordinators are expected to solve the problems by mutual consent.

3 Financial arrangements

Students participating in this dual degree program will pay their normal tuition and registration fees at their home universities. During the term

of the agreement, the host institution agrees to waive all tuition fees for incoming students under this agreement.

However, students will have to pay a small student registration fee at the host institution, if required. The host university will arrange for accommodation in a student dormitory, if wanted and possible.

Participants of the dual degree program are responsible for their own travel and living expenses during the exchange, if there is no third party funding. The home as well as the host institution will, however, try to get financial support to defray all or part of those expenses.

Technische Universität Berlin
Date: 17. März 2010

Prof. Dr. Kurt Kutzler
President, Technische Universität Berlin

Politechnika Warszawska
Date:

Prof. Włodzimierz Kurnik. Ph.D.. D.Sc.
Rector, Warsaw University of Techology

Prof. Dr. Christian Boit
Dean of School of EE&CS

Prof. Jan Szmidt, Ph.D., D.Sc.
Dean, Faculty of Electronics and Information Technology

A Grading scheme

German grades for courses taken at TUB will be translated to Polish grades in the following way:

TUB Grades	WUT Grades
1,0 and 1,3	5,0
1,7 and 2,0	4,5
2,3 and 2,7	4,0
3,0 and 3,3	3,5
3,7 and 4,0	3,0
5,0 (failed)	2,0 (failed)

Polish grades for courses taken at WUT will be translated to German grades in the following way:

WUT Grades	TUB Grades
5,0	1,0
4,5	1,7
4,0	2,3
3,5	3,0
3,0	3,7
2,0 (failed)	5,0 (failed)

B Course Scheme of Computer Engineering at TUB

Semester/ECTS	Recommended course of studies of CE Master			
1. 30 ECTS	Aufbaustudium: Basic modules (ca. 12 ECTS) and advanced modules (ca. 18 ECTS) from catalogue			
2. & 3. 30 ECTS	in-depth elective (Schwerpunktfach) 24 - 30 ECTS	Mayor (Hauptfach) 12 - 18 ECTS	Mayor (Hauptfach) 12 - 18 ECTS	Studium Generale 6 ECTS
4. 30 ECTS	Master Thesis 30 ECTS			
120 ECTS				

Table 1: Course scheme of Computer Engineering Master at TUB.

Catalogs for advanced modules in TUB CE Master Program:

- Technical Applications (e.g. Embedded Systems, Computer Vision, Robotics)
- Telecommunication Engineering (e.g. Mobile Communication, Audio/Video Compression, Optical Communication)
- Microelectronics (e.g. Semiconductor Devices, Chip Design, Packaging)
- Software Engineering (e.g. Specification of Real Time Systems, Compiler Construction, Testing)
- Information Systems (e.g. Database Systems, Agent Technologies, AI Systems)
- Computer Technology (e.g. Microcontroller, Architecture of Embedded Systems, Hardware/Software Codesign)

The actual list and detailed description of the basic and advanced modules as well as of the catalogs is available at:
`http://www.eecs.tu-berlin.de/fileadmin/f4/fkIVdokumente/Module/master/TI/MSc-TI.pdf`

The Master Program at TUB assumes that a student coming from WUT in his/her previous academic education (fundamentals) has completed courses that may be at TUB considered equivalent to fundamentals listed in Table 2/3.

Modules	ECTS
Artificial Intelligence - Basics and Applications	6
Distributed Systems	6
Database Systems	6
High Frequency Technology	7
Communication Systems	6
Embedded Real-Time Systems	6
Object-Oriented Software Development	6
Communication Networks	6

Table 2: List of advanced modules (build-up) for Computer Engineering (CE) at TUB.

Modules	ECTS
Electronic Measuring Technique	6
Semiconductor Devices	6
Signals and systems	6
Circuit Technology	4
Integral Transforms and Partial Differential Equation	6
Software Engineering	6
Computer Network and Distributed Systems	6

Table 3: List of basic modules (build-up) for Computer Engineering (CE) at TUB.

C Course Scheme of Electrical and Computer Engineering at WUT

Specializations that are currently offered:

- Telecommunications (TCM)
- Computer Systems and Networks (CSN)

Semesters	1 ‖	2 ‖	3 ‖	4
		ECTS		
[CSN | TCM] Fundamentals		36		
[CSN | TCM] Advanced Courses		42		
Mathematics & Non-ECE Electives		9		
M.Sc. Diploma Project & Seminar		33		
$\sum$	33 ‖	30 ‖	30 ‖	27

Table 4: Course scheme of M.Sc. degree (graduate) in the area of Electrical and Computer Engineering at WUT.

During the 3rd/4th semester and depending on the specialization area (TCM or CSN) TUB students can be at least achieved 30 ECTS from the TCMAD-Class (Table 5) or CSNAD-Class (Table 6) by completing at least 5 courses of choice.
Further 3 ECTS (or 6 ECTS) from Non-ECE Electives can be achieved - meaning 1 course (or 2 courses) of choice (these might be omitted and compensated by courses at TUB, or by a course from the area of specialization).

Course details can be found
for the specialitation in Telecommunications (TCM) at:
`http://eres.elka.pw.edu.pl/eres_en/wklasy_en$kla.QueryViewByKey?P_ID_KLASY=TCMAD`
for the specialitation in Computer Systems and Networks (CSN) at:
`http://eres.elka.pw.edu.pl/eres_en/wklasy_en$kla.QueryViewByKey?P_ID_KLASY=CSNAD`
for the M.Sc. Diploma Project Seminar at:
`http://eres.elka.pw.edu.pl/eres_en/wklasy_en$kla.QueryViewByKey?P_ID_KLASY=DIPLAD`

Courses (or groups of courses)	ECTS
Discrete Random Processes	6
Parallel Numerical Methods	6
Image and Speech Recognition	6
Digital Signal Processor Architecture and Programming	6
Pattern Recognition	6
Cryptography and Data Security	6
Data Mining	6
Evolutionary Algorithms	6
Intelligent Information Systems	6

Table 5: List of advanced courses for Computer Systems and Networks (CSN) - specialization at WUT (CSNAD-Class).

Courses (or groups of courses)	ECTS
Analysis and Design of Communications Protocols	6
Adaptive Image Recognition	6
Adaptive Signal Processing	6
Computational Electromagnetics for Telecommunication	6
Digital Communications	6
IP Multimedia Subsystem	6
Intelligent Networks	6
New Generation of Optical Networks	6
Queuing Theory	6
Techniques and Algorithms for Signal Processing	6
Wide Area Networking	6
Optical Communications	3

Table 6: List of advanced courses for Telecommunications (TCM) - specialization at WUT (TCMAD-Class).

The Master Program at WUT assumes that a student coming from TUB in his/her previous academic education (fundamentals) has completed courses that may be at WUT considered equivalent from TCM resp. CSN fundamentals.

Courses (or groups of courses)	ECTS
Algorithms and Data Structures	6
Computer Architecture	6
Computer Graphics	6
Computer Networks	6
Data Bases	6
Operating Systems	6

Table 7: List of fundamental courses for Computer Systems and Networks (CSN) - specialization at WUT (CSNAT-Class).

Courses (or groups of courses)	ECTS
Communications	6
Digital Signal Processing	6
Optical Fiber Transmission	6
Satellite Communication Systems	6
Signals and Systems	6
Signal Processing in Telecommunications and Radar	6

Table 8: List of fundamental courses for Telecommunications (TCM) - specialization at WUT (TCMAT-Class).

D Examples

1. Semester (WiSe)	Messtechnik (6 ECTS)	ITPDG (6 ECTS)	Kommunikationsnetze (6 ECTS)	Künstliche Intelligenz (6 ECTS)	Verteilte Systeme (6 ECTS)
2. Semester (SoSe)	NGN Basis (6 ECTS)	NGN Projekt 1 (6 ECTS)	Optische Kommunikationsnetze (Teil 1) (6 ECTS)	RoboCup Master (9 ECTS)	Studium Generale (3 ECTS)
3. Semester (WiSe)	NGN Projekt 2 (6 ECTS)	Computer Graphics Projekt 1 und Seminar (9 ECTS)	Optische Kommunikationsnetze (Teil 2) (6 ECTS)	Modelle zur Informationsverarbeitung im Gehirn (6 ECTS)	Studium Generale (3 ECTS)
4. Semester (SoSe)			Masterarbeit		

Table 9: Example study plan for students starting in winter term at TUB.

1. Semester (SoSe)	Signale & Systeme (6 ECTS)	ITPDG (6 ECTS)	Objektorientierte Softwareentwicklung (6 ECTS)	Nachrichtenübertragung (6 ECTS)	Datenbanksysteme (6 ECTS)
2. Semester (6 ECTS)	Generative Computer Graphics (9 ECTS)	CIT5-Masterprojekt (3 ECTS)	Digitale Nachrichtenübertragung (Teil 1) (9 ECTS)	Maschinelles Lernen 1 (3 ECTS)	Studium Generale (WiSe)
3. Semester (SoSe)	Modellierung in der Computergrafik (6 ECTS)	Medizinische Anwendungen der Informatik (6 ECTS)	Digitale Nachrichtenübertragung (Teil 2) (9 ECTS)	Hot Topics in Machine Learning and Artificial Intelligence (6 ECTS)	Studium Generale (3 ECTS)
4. Semester (WiSe)			Masterarbeit		

Table 10: Example study plan for students starting in summer term at TUB.

1. Semester	Graphs and Networks	Theoretical Foundations of Multimedia	Fundamentals of Digital Switching	Fundamentals of Digital Transmission	Digital Information Transmission	New Generation of Optical Networks	Synthesis and Optimization of Digital Systems	Digital Systems
(WiSe)	(5 ECTS)	(4 ECTS)	(5 ECTS)	(5 ECTS)	(4 ECTS)	(4 ECTS)	(4 ECTS)	(4 ECTS)
2. Semester	Analysis and Design of Communication Protocols	Digital Image Processing	Design of Dependable Digital Systems	IP Networking	Mobile Communication Systems	Multi-Service Computer Networks	Transmission Systems	
(SoSe)	(4 ECTS)	(5 ECTS)	(4 ECTS)	(5 ECTS)	(5 ECTS)	(5 ECTS)	(5 ECTS)	
3. Semester	Ad-hoc und Sensornetzwerke (VL)	Sensornetze (PR)	Betrieb Komplexer IT-Systeme (VL)	Operating complex IT-Systems (Seminar)	Machine Intelligence / Neuronale Informationsverarbeitung I	Security in Telecommunications (Seminar)	Security in Telecommunications (Projekt)	
(WiSe)	(3 ECTS)	(3 ECTS)	(6 ECTS)	(3 ECTS)	(6 ECTS)	(3 ECTS)	(6 ECTS)	
4. Semester (SoSe)	Masterarbeit							

Table 11: Example study plan for a student coming from WUT.